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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/336,373	01/03/2003	Harry Hedler	6521/89030	7013
24628	7590	10/17/2005	EXAMINER	
WELSH & KATZ, LTD 120 S RIVERSIDE PLAZA 22ND FLOOR CHICAGO, IL 60606			MITCHELL, JAMES M	
			ART UNIT	PAPER NUMBER
			2813	

DATE MAILED: 10/17/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/336,373

Applicant(s)

HEDLER ET AL.

Examiner

James M. Mitchell

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 July 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This office action is in response to applicant's amendment filed July 18, 2005.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claim 1, 2, 4, 5, 8, 11, 13, 14, 17 and 18 are rejected under 35 U.S.C. 102(e) as being anticipated by Richards (U.S. 6,355,981).

4. Richards (Fig. 17-22b) discloses:

(cl. 1, 17) a method of producing semiconductor chips with a protective chip-edge layer for wafer level packaging chips, with the steps of: preparing a semiconductor wafer (300), providing trenches (303) in the semiconductor wafer to establish chip edges on a first side of the semiconductor wafer, providing wiring plane and elevated contact elements (305), filling the trenches by dealing out a protective agent (306) and therefore dispensing, grinding back the semiconductor wafer from a second side of the semiconductor wafer (Fig 21; C(l. 16, Lines 65-67), which is opposite from the first side, to expose the trenches filled with the protective agent; and cutting through the trenches (Fig.20) filled with the protective agent, so that the protective chip- edge layer

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comprising the protective agent remains on the chip edges said protective layer/agent comprising a flexible material ("polyimide"; Col. 9, Lines 25-28);

(cl. 2) in that the grinding back takes place before the cutting through (Fig. 21).

(cl. 4) and the provision of the trenches is carried out by a first sawing step (Col. 7, Lines 61-64);

(cl. 5) filling the trenches by dealing out a protective agent (306) and therefore dispensing (Col. 9, Lines 39-41);

(cl. 8) the filling of the trenches is performed in the course of applying a protective layer, which covers the first side at least partially outside the trenches (Fig. 20).

(cl. 11) and cutting through of the trenches filled with the protective agent is carried out by a second sawing step, the saw blade being thinner than the width of the trenches (Fig 22a);

(cl. 13) protective layer/agent comprising a flexible material ("polyimide"; Col. 9, Lines 25-28);

(cl. 14) the semiconductor chips are wafer level packaging chips (3a,b) and an appropriate wiring plane is provided on the first side of the semiconductor wafer (305);

(cl. 17) and wiring has a surface that juts out from wafer surface and therefore protrudes (Fig. 19);

(cl. 18) and the filling trenches are performed in the course of applying a protective layer (Fig. 3C).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 3, 6, 7 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Richards (U.S. 6,355,981) in combination with Lin et al. (U. S 6,537,851).

7. Richards discloses the elements stated in paragraph 5, but does not disclose forming its protective material explicitly by printing or molding step or that the grinding steps occurs after cutting.

8. Lin teaches forming a resin on a surface by either molding (CLAIM 95 of Lin) or printing (Col. 9-10, Lines 66-2).

9. It would have been obvious to one of ordinary skill in the art to incorporate the process of either a molding or printing step in order to form material on a surface as required by Richards (Col. 9, Lines 39-41).

10. With respect to claim 3 and 16, applicant has not disclosed that the order produces a particular unobvious purpose, produces an unexpected result, or is otherwise critical. As such the claimed order would have been an obvious, since it has been held that, in a well known process, the order of performing process steps is prima facie obvious in the absence of new or unexpected results. Ex parte Rubin 128 USPQ (PO BdPatApp 1959).

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11. Claims 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Richards (U.S. 6,355,981) in combination with Suda et al. (U.S. 2004/0012698).

12. Richards discloses the elements stated in paragraph 5, but does not disclose cutting by laser.

13. However Roberts discloses the same invention except that dicing is made by blade/cutting instead of laser, Suda shows that dicing by laser or cutting provide equivalent structures known in the art known in the art. Therefore, because these two processing steps are art recognized equivalents at the time the invention was made, one of ordinary skill in the art would have found it obvious to substitute a using a laser to dice instead of a blade.

14. Claims 1-5, 8, 11 and 13-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohuchi (U.S. 6,107,164) in combination with Chana (U.S. 6,767,8181) and Kinsman (U.S. 6,717,245).

15. Ohuchi (Fig. 3A-4C) disclose:

(cl. 1, 17) a method of producing semiconductor chips with a protective chip-edge layer for wafer level packaging chips, with the steps of: preparing a semiconductor wafer (10), providing trenches (22) in the semiconductor wafer to establish chip edges on a first side of the semiconductor wafer, providing wiring plane and elevated contact elements (3, 4, 5), filling the trenches by dealing out a protective agent (23) and therefore dispensing, grinding back the semiconductor wafer from a second side of the

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semiconductor wafer (Fig. 4A), which is opposite from the first side, to expose the trenches filled with the protective agent; and cutting through the trenches (26; Fig. 4B) filled with the protective agent, so that the protective chip- edge layer comprising the protective agent remains on the chip edges;

(cl. 2) in that the grinding back takes place before the cutting through (Fig. 4A-B).

(cl. 4) and the provision of the trenches is carried out by a first sawing step (Fig. 3B);

(cl. 8) the filling of the trenches is performed in the course of applying a protective layer, which covers the first side at least partially outside the trenches (Fig. 3C).

(cl. 11) and cutting through of the trenches filled with the protective agent is carried out by a second sawing step, the saw blade (26) being thinner than the width of the trenches (Fig 4B).

(cl. 14) the semiconductor chips are wafer level packaging chips and an appropriate wiring plane is provided on the first side of the semiconductor wafer (4C).

(cl. 15) the wiring plane is provided before the forming of the trenches (Fig 3A).

(cl. 18) and the filling trenches are performed in the course of applying a protective layer (Fig. 3C).

16. Ohuchi does not appear to explicitly disclose that its contact elements are flexible or that its protective layer/agent is flexible.

17. Chana (Fig. 2) discloses flexible bumps ("compliant"; Col. 8, Lines 24-27).

18. It would have been obvious to one of ordinary skill in the art to form the contacts of Ohuchi of a flexible material in order to improve stress buffering layers as taught by Chana (Col. 87, Lines 24-27).

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19. With respect to the material of the protective layer, the modified structure of Ouchi discloses the same invention except that the protective layer is an epoxy, Kinsman (Col. 6, Lines 24-30) shows that epoxy and polyimides¹ form equivalent encapsulant structures known in the art. Therefore, because these two materials form art recognized equivalents at the time the invention was made, one of ordinary skill in the art would have found it obvious to substitute polyimide for epoxy to form an encapsulant.

20. Furthermore, the type of encapsulant material would have been obvious since it has been held that to be within the general skill of a worker in the art to select known material on the basis of its suitability for intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416 (CCPA 1960).

21. With respect to claims 3 and 16 that grinding taking place after cutting or wiring is after filling trenches, see paragraph 10 of this office action.

22. Claims 6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohuchi (U.S. 6,107,164), Chana (U.S. 6,767,818) and Kinsman (U.S. 6,717,245) as applied to claim 1 and further in combination with Lin et al. (U. S 6,537,851).

23. Neither Ohuchi, Chana nor Kinsman appears to disclose how to form its resin on its surface.

24. Lin teaches forming a resin on a surface by either molding (CLAIM 95 of Lin) or printing (Col. 9-10, Lines 66-2).

¹ Flexible material admitted by applicant, see application claim 10.

25. It would have been obvious to one of ordinary skill in the art to form the modified resin structure of Ohuchi by either molding or printing in order to form a resin on a surface as required by Ohuchi (23; Fig 3C).

26. Claims 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohuchi (U.S. 6,107,164), Chana (U.S. 6,767,8181) and Kinsman (U.S. 6,717,245) as applied to claim 1 and further in combination with Trevail et al. (U.S. 3,924,3232).

27. Neither Ohuchi, Chana nor Kinsman appear to disclose attaching a first side of a wafer to a carrier before grinding and covering the second side of said wafer before separation with polyimide or silicone.

28. Trevail (Fig. 2) teaches attaching a first side of a wafer to a carrier (26) before grinding and covering (25) the second side of said wafer before separation (Col. 1, Lines 55-57 & Col. 2, Lines 23-28) with a flexible, polyimide or silicone ("other resin" ; Col. 2, Lines 34-36).

29. It would have been obvious to one of ordinary skill in the art to incorporate attaching a first side of the modified wafer of Ohuchi to a carrier before grinding and covering the second side of said wafer before separation in order to cut the wafer as taught by Trevail (Col. 1, Lines 55-57 & Col. 2, Lines 23-28).

30. Claims 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ohuchi (U.S. 6,107,164) and Chana (U.S. 6,767,8181) and Kinsman (U.S. 6,717,245) as applied to claim 1 and further in combination with Suda et al. (U.S. 2004/0012698).

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31. Neither Ohuchi, Chana Kinsman disclose cutting by laser.

32. However the modified structure of Ohuchi discloses the same invention except that dicing is made by blade/cutting instead of laser, Suda shows that dicing by laser or cutting provide equivalent structures known in the art known in the art. Therefore, because these two processing steps are art recognized equivalents at the time the invention was made, one of ordinary skill in the art would have found it obvious to substitute a using a laser to dice instead of a blade.

Response to Arguments

33. Applicant's arguments with respect to claims have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

34. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The prior art discloses various examples of flexible material formed on wafers.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the

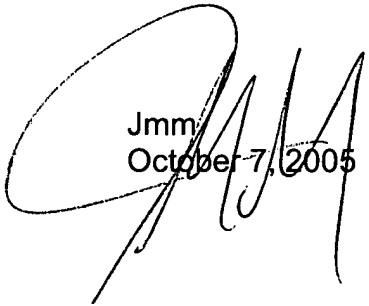
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shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to James M. Mitchell whose telephone number is (571) 272-1931. The examiner can normally be reached on M-F 8:00-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead Jr. can be reached on (571) 272-1702. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Jmm
October 7, 2005



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